BSc Computer Science Syllabus

Semester-I

SEMESTER – I	
Introduction to Programming and Algorithm using C - Practical	
Unit	**Unit Details**
I	**Fundamentals of Programming Techniques:** **Tools and Techniques of Problem Analysis:** Algorithm Development and Flow Chart - Examples in Algorithm Development and Flow Chart **Introduction to Programming Languages:** Introduction to Machine level language, Assembly language, Higher level language, Limitations and Features - Classification of Computer Language - Procedural Language and Non Procedural Language. **Introduction of C Language:** History of C, Basic Structure of C, Executing C program - Character set & C Tokens - Identifiers & Keywords - Data Types - Storage Class - Constants and Variables - Type Casting - Comments
II	**C Language Operators and Decision Making:** **Console based I/O and related built-in I/O function:** Formatted functions :printf(), scanf() - Unformatted functions: getch(), getchar(), putchar(), getche, putch(), gets(), puts() - Concept of Header files and #include, #define **Operators & Expression:** Types of Operators and Expression, Precedence & Associativity - Decision Making Structure-If, If-else, Nested If-else, Switch
III	**Control Structure & Array:** **Loop Control Structure:** While, Do-While, For, Nested loop **Other Statements:** break, continue, goto, exit **Array:** One, Two-Dimensional Arrays - Initialization and working with Array - Introduction to Multidimensional Arrays.
IV	**String & Functions:** **Character Arrays and Strings:** Initialization and working with String - Comparing and String Handling functions. **User Defined Functions:** Introduction of UDF - Elements of UDF - Categories of UDF: *No argument no return value - Arguments but no return value - No argument but returns a value - Arguments with return value* – Recursion - Nesting Function - Variable Scope - Visibility and lifetime in function.

Text Book:

1. Programming in ANSI C. (6^{th} Ed.) – Balaguruswami - Tata McGraw Hill Publication

Reference Books:

1. Programming In C (2^{nd} Ed.) - Ashok N. Kamthane - Pearson Education
2. The C Programming Language - DENNIS M. RITCHIE- AT&T Bell Laboratories Murray Hill, New Jersey
3. Let us C – (15^{th} Ed.) - Yashwant Kanetkar - BPB Publications
4. Programming in C - Reema Thareja - Oxford University Press

PRACTICALS	
Introduction to Programming and Algorithm using C - Practical	
Unit	**Practical List**
I	1. Find the Simple Interest. Inputs are principal amount, period in year andrate of interest. 2. Find the area and perimeter of square and rectangle. Input the side(s) through the keyboard. 3. Accept any three numbers and find their squares and cubes. 4. Write a program to enter the temperature in Fahrenheit and convert it to Celsius.[C = ((F-32)*5)/9] 5. Write a program to store and interchange two numbers in variables a andb. 6. Write a program to accept an integer and display it in octal and hexadecimal formats. 7. Write a program to enter two numbers and find the smallest out of them.Use conditional operator. 8. Write a program to find the average temperature of five sunny days. Assume the temperature in Celsius. 9. Write a program to enter text with gets() and display it using printf() statement also find the length of the text. Write a program to enter a number and carry out modular division operation by2, 3 and 4 and display the remainders.
II	1. Write a program to check given year is a Leap year or not. 2. Write a C program to find minimum from given 3 numbers (Using Conditional Operator). 3. Write a C program to find the maximum from given three numbers (Using Nested IF). 4. Write a C program to find that the accepted no is Negative, Positive or Zero. 5. Write a C program to find the maximum from given three numbers (Without using Nested if, or Logical Operator, Or Conditional operators). 6. Take marks from the user and print grade accordingly (>=75 marks – Distinction, <75 and >=60 marks – First, <60 and >=50 – Second, <50 and >=35 – Pass, <35 – Fail) using if … else if….else statement and also by usinglogical operators). 7. Write a program to accept number of seconds and display its correspondinghours, minutes and seconds. 8. Take 2 numbers from the user and print the greater number (Number can beequal). 9. Write a program to check whether the blood donor is eligible or not for donating blood. The conditions laid down are as under. Use if statement.a)Age should be above 18 yrs but not more than 55 yrs. 10. Write a program to calculate bill of a job work done as follows.Use if else statement.a) Rate of typing 3 Rs/pageb) Printing of 1st copy 5Rs/pages & laterevery copy 3Rs/page.The user should enter the number of pages and print out copies he/she wants.
III	1. Write a program to find sum of N numbers. (Using while loop) 2. rite a program to print 1,2,3,...N where N number scanned by user. (Using while loop) 3. Write a program to find factorial of given number . 4. Write a program to find reverse of a given number. 5. Write a program to find the sum of first 100 odd nos. and even nos. 6. Write a program to find maximum from given N inputs by user. 7. Write a program to find sum of the digits entered by the user.

	8. Write a program to generate Fibonacci series up to N numbers. 9. Write a program to find GCD and LCM of given 2 numbers. 10. Write a program to check whether given number by the user is Palindrome or not. 11. Write a program to check Whether the given number is Prime or not. 12. Write a C program to find xl+x2+x3+x4+ 13. Write a program to print following pyramid. * ** *** **** 14. Write a program that accepts an integer N, if the integer N = 4, then print the pyramid: 1 121 12321 121 1
IV	1. Write a program which will take 10 numbers from user and stored it in the array. It will print all the numbers, their sum and average of it. 2. Write a program to find binary of given number. 3. Write a program to sort and array. 4. Write a program to search an element from the array. 5. Write a program to find addition of two matrices of 3*3. 6. Take two strings from the user and check whether the string is palindrome or not. 7. Write a program to find sum, average of two numbers passed to user defined functions called sum(int,int) and average(int,int). 8. Write a program to print Fibonacci series using recursive UDF. 9. Write a program to find length of the given string (without including string.h). 10. Write a program which will accept two strings from the user and print the message that the strings are same or not. 11. Write a program that uses function digit(N,k) that return the value of the kth digit from the right of the number N. For eg. The function call digit (254693,2) should return 9.

SEMESTER –I	
Digital Computing	
Unit	**Unit Details**
I	Introducing Today's Technologies – Computers, Devices, and the Web: Today's Technology – Computers – Types Of Computers: Servers-Mobile Devices- Game Devices- Embedded Computers - Generations of Computers - Data and Information - The Web - Digital Security and Privacy -Programs and Apps - Operating Systems – Applications - Technology Uses - Technology Users - Cloud Computing – Artificial Intelligence Ports and Connectors – Buses
II	Processors, Memory, Adapters and Buses:Inside the case: Motherboard – Processors – Memory - Adapters Digital Storage: Storage Hard Drives -Portable Flash Memory Storage - Optical Discs -Enterprise Storage
III	Input and Output Devices: Input Devices: Keyboards - Pointing Device - Touch Screens - Pen Input - Motion, Voice, andVideo Input - Scanners and Reading Devices Output Devices: Displays – Printers - Other Output Devices
IV	Computer Codes: Introduction to Computer Codes: Decimal System-Binary System-Hexadecimal System-OctalSystem-4-bit BCD System-8-bit BCD System-ASCII code-16-bit Unicode Conversion of Numbers (includes fixed and fractional number): Non decimal to decimal -Binary to decimal - Decimal to Binary - Octal to Binary - Octal to Decimal - Decimal to Octal - Binary to Hexadecimal - Hexadecimal to Binary - Hexadecimal to Decimal - Decimal toHexadecimal - Hexadecimal to Octal - Octal to Hexadecimal
Text Book: Discovering Computers 2016 - 1st Ed. - Misty E. Vermaat; Susan L. Sebok; Steven M. Freund; Jennifer T. Campbell; Mark Frydenberg (Shelly Cashman Series) - Cengage Learning	
Reference Books: 1.Computer System Architecture – 3rd Ed. - M. Morris R. Mano- Pearson India 2.Fundamentals of Computer - 1st Ed. Publisher – Balaguruswamy- McGraw-Hill 3.Computer Fundamentals - P.K Sinha 4. Fundamentals of Computers – 5th Ed. – PHI - V. Rajaraman	

SEMESTER-I	
	Matrix Algebra and Co-ordinate Geometry (Theory)
Unit	**Unit Details**
I	Introduction to matrices, different types of matrices, operations on matrices, Theorems on matrices, Elementary operations on matrices and types of matrices, Symmetric and skew-symmetric matrices, Hermitian and skew-Hermitian matrices, orthogonal matrices, unitary matrices, normal matrices, Elementary Matrices. Linear dependence and independence of row and column matrices, Row rank, column rank and rank of a matrix, Row Reduced Echelon (RRE) form of a matrix and matrix inversion using it.
II	Eigen values, Eigen vectors and the characteristic equation of a matrix. Cayley-Hamilton (CH) theorem and its use in finding inverse of a matrix, Application of matrices in solving a system of simultaneous linear equations, Cramer's rule, Theorems on consistency of a system of simultaneous linear equations.
III	**Sphere and Introduction to conicoid:** Definition of a sphere in R3, Cartesian equation of a sphere, General equation of a sphere, Equation of a sphere with diametrically opposite end points, Intersection of a sphere with Line/plane/sphere(No theory but only problems), Equation of a tangent plane to a sphere. The tangency of a plane and normality of a line to a sphere, Orthogonal spheres. Conicoids: Introduction to conicoid, types of central and non central conicoids in R3, figures of conicoids.
IV	**Various coordinate systems and Cone and cylinder in R^3:** Polar coordinates in R2& R3 and its Relationships with Cartesian coordinates, polar equation of line/circle/conic and properties of conics. Spherical, Cylindrical, Conical coordinates in R3. Introduction to different types of cone and cylinder, Equations of enveloping cone/cylinder, Right circular cone/cylinder (without proof), Problems on cone and cylinder.
Text Book:	
Reference Book: 1. H. Anton, Elementary linear algebra with applications (8th Edition),John Wiley (1995). 2. Linear Algebra Theory and Applications – Ward Cheney, David Kincaid. Jones and Bartlet India Pvt. Ltd. 3. Introduction to Linear Algebra – Serge Lang. Springer (India). 4. Gilbert Strang, Linear Algebra and its Applications (English) 4th edition, Academic press, Indian edition. 5. Matrix and Linear Algebra – K. B. Dutta, Prentice Hall. 6. A Textbook of Matrices – Shanti Narayan, P K Mittal, S. Chand Group. 7. AnalyticalSolid Geometry- Shanti Narayan 8. Co-ordinate Geometry By : R.J.T. Bell. 9. Solid Geometry(three dimension) – H. K. Das ,S. C. Saxena and Raisinghania , S. Chand 10. Coordinate Geometry, Polar Coordinate approach, M M Tripathi, Alpha Science International	

SEMESTER-I	
	Practicals: Matrix Algebra and Co-ordinate Geometry
Units	**Unit Detail**
	1. Matrix algebra. 2. Different methods of finding Inverse of a matrix. 3. RRE form and rank of a matrix. 4. Solution of system of linear equations using row operations and Cramer's rule. 5. Linearly independent and dependent vectors. 6. The Cayley-Hamilton theorem and its applications 7. Eigenvalues and eigen vectors of matrices. 8. Various coordinate systems in R2 and polar equation of line. 9. Various coordinate systems in R3.Transformation equations from one system to another system. 10. Polar equations of Circle. 11. Polar equations of Conic. 12. Sphere-I. 13. Sphere-II. 14. Cone. 15. Cylinder. 16. Project on Identification of curves/surfaces

SEMESTER-I	
	Descriptive Statistics and Regression Analysis
Unit	**Unit Details**
I	Data and data visualization: Types of data, Classification of data, Levels of data measurement, Classification, Presentation: Graphical and Diagrammatic presentation (concepts only) of data, Measures of central tendency: Mean, Median and Mode, Empirical relation between mean, median and mode, Partition values, Merits and demerits, Boxplot.
II	Measures of dispersion and Shape: Measures of Dispersion, Absolute and relative measures of dispersion with their merits and demerits, Moments: raw moments, central moments, factorial moments and their interrelationship , Skewness and Kurtosis and their measures.
III	Bivariate data: Concept of bivariate data, Correlation: Introduction, Scatter diagram, Types of Correlation, Methods of Measuring Correlation: Karl Pearson's correlation, Spearman's Rank correlation, Kendall rank Correlation, Association of attributes, Methods of measuring association of attributes.
IV	Regression Analysis: Concept of Regression for two variables, Lines of regression, properties of regression coefficient, regression curve, Regression and correlation in three variables, Yule's notations, plane of regression, Properties of Residuals, Multiple and Partial Correlation coefficient and their interrelationships.
Text Book:	
Reference Book:	

SEMESTER-I	
	Probability Theory
Unit	**Unit Details**
I	Probability: Introduction to probability, Basic concepts, random experiment, events, equally-likely events, mutually exclusive events, exhaustive events, Independent events, Classical, statistical and modern approach to probability, Addition and Multiplication theorem (without proof), Conditional probability, Baye's rule.(without proof for two events)
II	Random Variables and Mathematical Expectation: Concept and Types of Random variables, Probability mass function (p.m.f.), probability density function (p.d.f.) (simple problems), Distribution function, Expectation and variance of a random variable and their basic properties.
III	Generating functions: Moments and Cumulants, Moment generating function, Cumulant generating function and Characteristic Function, Uniqueness and Inverse Theorems (without proof) along with applications..
IV	Bivariate Random Variables, Joint, marginal and conditional p.m.f. of two random variables. Joint, marginal and conditional p.d.f. of two random variables, Independence of two random variables, Conditional mean and conditional variance
Text Book:	
Reference Book:	

SEMESTER-I	
Electives	
Logic	
Unit	**Unit Details**
I	**Mathematical Logic:** Statement, negation, conjunction, disjunction, statement formulas and truth table, conditional and bi-conditional, well-formed formula, tautology, equivalence of formulas, duality law, tautological implications, functionally complete set of connectives, other connectives, D.N.F, C.N.F, P.D.N.F, P.C.N.F
II	**Theory of Inference and the Predicate Calculus:** Rules of inference, consistency of premises, the indirect method of proof, automatic theorem proving, Predicates, the statement function, variables, Quantifiers, predicate formulas, free and bound variables, the universe of discourse, the theory of inference for predicate calculus
TextBooks:	

Reference Book:

1. Discrete Mathematical Structure with application to computer science – J. P. Trembly & R. Manohar, McGraw Hill
2. Logic for computer science – Uwe Schoning, Birkhauser, Boston
3. Elements of Discrete Mathematics – A computer oriented approach – C. L. Liu, D. P. Mohapatra, TMT
4. Discrete Mathematics – N. Chandrasekaran, M. Umaparvathi, PHI
5. Discrete Mathematics & Combinatorics – T. Sengadir, Pearson
6. Discrete Mathematics – Schaum series
7. Discrete Mathematics Kenneth Rosen
8. Logic and Discrete Mathematics, A concise Introduction- Willem Conradie and Valentin Goranko, Wiley.

SEMESTER-I	
Electives	
General English	
Unit	**Unit Details**
I	Selected Stories from Malagudi Days by R K Narayan Indian thought Publication List ofstories. **Note**: Short question-answers and theme based short notes should be asked.
II	**Animal Farm** – George Orwell. Critical study of the novel. **Note:**Short question-answers and theme based short notes should be asked.
III	**Grammar** • Tenses -Subject-verb agreement-Preposition- Articles - Modals
IV	**Speaking Skills** • Pronunciation (identification of sounds, vowels & consonants) - Syllable division (fromthe list attached) -Rhyming words - Vocabulary from the texts
TextBooks: 1. Malgudi Days By- R.K Narayan. 2. Animal Farm By- George Orwell	
Reference Book: 1. Enrich your English – by CIEFL (Academic Skills book) 2. Contemporary English Grammar – by Raymond Murphy 3. Essential English Grammar - by Raymond Murphy	

SEMESTER-I	
Electives	
Office Automation	
Unit	**Unit Details**
I	Introduction to Operating System, DOS and Windows DOS - Definition - Types - Functions - Booting Process - Introduction To DOS - Comparison with GUI - Wildcard characters - Working with DOS cmds: DIR, MD, RD, CD, Copy, Type, DEL, REN, Date, time CLS, VER, Move, ATTRib, Xcopy Windows : Components Of Windows : Desktop - Icon - My computer - My documents - Network Neighborhood - Recycle bin - Start menu - Taskbar - Windows explorer Control Panel: Date & time - Display - Mouse - User accounts - Add & remove programs Files and Folders Creating Folder - Folder Operations(copying , moving and deleting) - Creating files & file operations - Creating Shortcuts System Tools: Disk Defragmentation
II	MS Word & Introduction to Excel MS Word Introduction Creating word documents - Navigating and editing word documents - Formatting, viewing and printing a document MS Word Advanced Features: Working with tables and graphics - Mail Merge - Other Features Autocorrect - Autotext - Macros - Protecting documents MS Excel: Introduction To Excel - Concept of Workbook - Worksheet, Workspace - Types of data -Formatting Workbook - Conditional formatting - Sorting Data
III	MS PowerPoint MS Powerpoint Introduction : Creating ,browsing &saving Presentation -Editing & formatting slides - Working with objects Enhancing presentation using multimedia - Transitions - Preset Animation -Rehearse Timings - Pack & go wizard - Pen - Custom Show
IV	Advanced Excel Advanced Excel Features: Data validation - Data filter (Auto & Advance) - Charts - What if analysis - Goal seek - Scenario - Protecting Worksheet - Types of error Functions and Formulas : Mathematical Round, ceil, floor, fact, subtotal, sum , sumif - Logical AND, OR, NOT, if - Statistical Min, max, avg, count if - Text Concatenate, Exact, find, left, right, len, lower, upper, trim – Lookup: Hlookup, Vlookup - Date and Time : Date, day, days360, hour, minute, now, second, time, today, year, datediff
Text Book: Office 2013 for Dummier - Wallace wang - Publisher: John Wiley and sons, Inc	
Reference Book: Office 2013 in Simple StepBible – Lisa A. Bucki, John akenbanch, Fathe wempen, Michael Alexander and Dick kuseika - Publisher: Wiley	

Semester-II

SEMESTER - II	
Web Designing	
Unit	**Unit Details**
I	**Introduction to HTML 5** • Introduction to HTML5 • New Structure • New Form Elements and Attributes • Browser support , migration html4 to html 5 • The <!DOCTYPE html> Element • Introduction to new elements in HTML 5 • The Markup Elements using : ▪ <section> , ▪ <article> ▪ <aside> ▪ <details> ▪ <figcaption> ▪ <figure> ▪ <footer> ▪ <header> • The Media Elements ▪ <audio> ▪ <video> ▪ <plug-ins> • HTML Graphics: • The Canvas Elements • And SVG (Scalable Vector Graphics) **The form elements**
II	**Introduction to CSS** : Understanding the concepts of CSS - Advantages and disadvantages - **CSS syntax** - Grouping selectors and rulers - Using the class selectors - Using the ID selectors - Comparing ID and classes selectors - UsingCSS comments **Types of Style sheets**: External – Internal – Inline **CSS properties and text attributes:** Color – Alignment – Decoration – Transformation – Indent - Letter spacing and word spacing - White - pace -Line-height – Direction - Unicode-bidi **CSS Padding:** Using padding properties - Setting padding for all sides - Setting padding for each side - List properties (list-style-images, list- style-position, liststyle - type, list-style) - CSS positioning(relative, absolute, fixed and Z-index) - CSS properties and table attributes **Advance CSS:** Css rounded corners - Border images - Css gradient - Css shadow - Css font & Text effects - Css 2D & 3D Transform - CSS transition &Animations

III	**JavaScript Introduction:** Understanding JavaScript - About Dynamic HTML - Selecting an development environment for JavaScript - HTML and JavaScript **Advanced JavaScript:** Element of JavaScript – Variables – Operators - Flow control statement – Arrays – Functions - Event handling - Browser and JavaScript - Web page and JavaScript - validating User forms
IV	**Introduction to jquery :**About jquery **Using jquery:** The two jquery downloads - Including jquery (Using script) -Basic jquery syntax - Connecting jquery to the load event **Using Selectors:** Selecting elements by ID - Selecting elements by Class - Selecting elements by Type - Selecting elements by Hierarchy - Selecting elements by Attribute **Functions:** Traversing the DOM - Changing text and HTML - Inserting Elements **Events:** Binding and Unbinding - All Events

Textbook:

1. **A Complete Guide to Internet and Web Programming (Edition-2010)**
   Publisher: Dream Tech Press.
   By Deven N. ShahPublisher: DreamTech Press
   (Chapter- 3, 4 for unit 1,2)
2. **Javascript 2nd Edition Step by step**
   Publisher: Microsoft Corporation by: O'Reilly Media, IncBy
   Steve suehring
   (Chapter-22 for unit 3)
3. **XML and Related Technologies (First Edition 2009)**
   Pearson Education
   By Atul Kahate
   (Chapter-1,2,3 for unit 3)
4. **HTML 5 in SIMPLE STEPS**
   Publisher : DREAMTECH PRESS
   BY Kogent Learning Solutions Inc

Reference Books:

1. **DHTML and CSS Advanced(First Edition-2006)**
   Publisher: Pearson Education.By
   Jason cranford Teaue
2. **Java Script Indian Edition(First Edition-2008)**
   Publisher: CENGAGE LearningBy
   Gosselin
3. **HTML 5, Javascript and jQuery 24-Hour Trainer** ,
   Publisher: Wiley Publication
   By Dane Cameron
4. **Step By Step XML(First Edition-2000)**
   Publisher: PHI Practice-Hall India. By
   Michael J. Young
5. **Sams Teach Yourself XML in 24 hours (First Edition-2006)**
   Publisher: PEARSON EducationBy
   Michael Morrison

SEMESTER - II	
Web Designing Practicals	
Unit	**Unit Details**
I	**Tags of HTML5, audio video images** 1. Create a webpage for online Jwellary shopping. Display Menu in left frame. Clicking on menu should display related webpage in right frame. Keep header andfooter frames to display related information. 2. Create Web page to apply in job using filling form online. 3. Create a webpage with images, with audio and video. 4. Inserting Image on a web page (with all attributes). 5. Write HTML program in which make image as a link. 6. Write HTML program to e-mail registration form. 7. Write code for create images using canvas 8. Create a web page for user registration form. Assume related information and useappropriate control.
II	9. Write HTML program which contains internal cascaded style sheet for p, h2, h3,body and font attribute. 10. Write HTML program which contains inline cascaded style sheet for text attributes. 11. Write HTML program which contains external cascaded style sheet for Listproperties user defined Classes and Id. 12. Write HTML program which contains all the css positioning properties throughinternal css using class selector. 13. Write HTML program using clip property & z-index property through external css. 14. Write HTML program which contains cascaded style sheet with margin attributes ofstyle sheet. 15. Write HTML program which contains internal style sheet with background & borderattributes of style sheet. 16. Write HTML program which contains external style sheet with Css font & css texteffects 17. Write HTML program which contains cascaded style sheet with Css 2D & 3DTransform. 18. Write HTML program which contains external css using CSS transition &animations.
III	19. Write a Javascript to print your name and surname on screen. 20. Write JavaScript to demonstrate the use of different dialogue boxes. For example: write messages good morning, good bye etc, take value from alert, confirmation forany operation. 21. Write a JavaScript program to calculate area of circle.(3.14*r*r) 22. Write a javascript to find the grade from student result using if condition. 23. Write a javascript to find sum of N numbers entered by user. 24. Write a JavaScript program to find factorial of a number. 25. Write a javascript to find reverse of given string. 26. Create JavaScript program which have list of color buttons, if user moves the mouseover to any color button that color will set to the background of document. 27. Create JavaScript program to create mathematical calculator. (functionality +,*,-,/) 28. Write a JavaScript program to validate a form which consist of name, Age, address,hobby(checkbox), gender(radio button), email.

IV	29. Small Project: Select the topic for website designing and design five attractive webpages using all css properties also use java script for login , registration form ect. 30. Write a simple jquery program to print alert message hello world. 31. Test if jQuery is loaded. 32. Scroll to the top of the page with jQuery 33. Disable right click menu in html page using jquery 34. Write a jquery for Limit character input in the text area including count 35. Write a jquery to Display a message when the context menu event is triggered onthe paragraph elements.

Reference Books:

1. DHTML and CSS Advanced(First Edition-2006)

Publisher:
Pearson
Education.
By Jason
cranford
Teaue

2. Java Script Indian Edition(First Edition-2008)

Publisher:
CENGAGE
LearningBy
Gosselin

3. HTML 5, Javascript and jQuery

24-Hour Trainer ,Publisher:
Wiley Publication
By Dane Cameron

SEMESTER – II	
Computer Organization and Advanced Microprocessors	
Unit	**Unit Details**
I	**Basic Computer Organization -** Von-Neumann Architecture - Functional Units - CPU operational Concept - Interrupt Concept - Bus Concept **Digital Systems and Basic Components of Circuit Design -** Digital Computer - Binary Information and signals - Binary Logic with Boolean algebra - Logic Gates **Analysis and Design of Digital Circuits -** Sequential circuits Vs. Combinational Circuits - Flip-Flops - Half Adders and Full Adder
II	**Integrated Circuits -** SSI , MSI , LSI , VLSI - Logic Families - Decoder and Encoder - Multiplexer and De-multiplexer **Data Representation** **Fixed point Numbers -** 1's complement - 2's complement **Floating point Numbers –** Normalization - IEEE Representation (Single precision)
III	**Memory Organization & Management -**Memory parameters **Classification of memory -** By functionality - By access method - By capability - Main memory Limitation - Instruction pre-fetch - Write Buffer **Cache memory -** Cache principle - Cache hit and cache miss - Cache replacement - Cache write - Cache coherence - Mapping(direct, associative, se associative)
IV	**Introduction to microprocessors –** Microcontroller - RISC & CISC Microprocessors - Scalar & super scalar processors - Vector & array processors **Intel 8086 -** Overview of 8086 Pin Diagram - 8086 Register organization - BIU & EU - Addressing modes of 8086 **Introduction to Advanced Microprocessors -** Introduction of AMD , MIPS and SUN's Sparc - Chronology of Intel processors - Mobile processors

Text Book:

1) Computer System
   ArchitectureBy:M. Morris
   Mano
   Publisher: PHI
2) Computer Architecture and Organization
   By:B. Govindrajalu
   Publisher: McGrawHill
3) Computer Organization and Advanced Microprocessors
   By: Tripti Dodiya & Zakiya Malek
   Publisher: Cengage

Reference Books:

1) Advanced Microprocessors and InterfacingBy:
   - Badri Ram
   Publisher: Tata Mcgraw Hill

SEMESTER-II	
	Calculus and Differential Equations (Theory)
Units	**Unit Details**
I	**Prerequisites (not to be asked but must be done):** Introduction of Differential equations, its order and degree. Family of curves leading to differential equation and its solution in family of curves, Different types of solutions (viz. General, Particular and Singular solutions). Constant of integration, Boundary/initial conditions, Differential equations of first order and first degree. a) Successive Differentiation: Introduction to successive derivatives, nth derivatives of some standard functions, Lebnitz theorem b) Mean Value theorems: Rolle's mean value theorem, Lagrange's mean value theorem, Different forms of LMVT, Cauchy's mean value theorem, Applications of MVTs.
II	a) Convergence and divergence of infinite series: Definition of series, Convergent and divergent series of real numbers, sum of series, different test of convergence of infinite series-convergence of geometric series, comparison test, practical comparison test, D'Alembert ratio test, Cauchy's root test, alternating series, power series. b) Taylor's and Maclaurin's Theorems (without proof), Expansions of some standard functions as infinite power series without validity of the expansions
III	a) Methods of solving differential equations of first order and degree one: Variable separable, Homogeneous and non- homogeneous differential equations, exact differential equations (without proof), Integrating factors, linear differential equation, Bernoulli's differential equation and Differential Equations reducible to them. b) Method of solving differential equations of first order and higher degree solvable for *y*, solvable for *x* ,solvable for*p* (where), Clairaut's differential equation, Lagrange's differential equation. dy p dx □
IV	a) Linear differential equations of higher order and degree one: Differential operators. Linear differential equations of higher order and degree one with constant coefficients, Complementary and particular integrals. Inverse operator, operational methods for its solutions, Euler form of homogeneous linear differential equations with variable coefficients.
Text Book:	

Reference Books:

1 Differential Caculus, Shanti Narayan, S. K. Mittal, S. Chand and Co. Publication.
2 Anton, Biven and Davis, Calculus, 10th edition, Willey Publication.
3 Thomas, Calculus early transcendental, Addison-Wesley person publication.
4 Integral calculus, Shanti Narayan, S. Chand Limited, 2005.
5 Elementary Differential Equations, Rainville and Bedient, Macmillan Publication.
B. Sc. Mathematics Page 4
6 Ordinary and Partial Differential Equations, M. D. Raisingania, S. Chand and Company, 2009.
7 Differential Equations- D.A. Murray, Tata McGraw Hills.
8 Ordinary Differential Equations and Partial Differential Equations, Nita shah, PHI Ltd.
9 Theory and problems on Differential Equations- Frank Ayres, McGraw Hill Book Co., New York.

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SEMESTER-II	
	MT 2502L: Calculus and Differential Equations (Practical)
Units	**Unit Details**
I	1.Gaphs of some Cartesian curves R2. (Trigonometric function, conic, polynomial) 2. Graphs of some parametric and polar curves in R2. (Cycloid, conic, asteroid, cardioids) 3. Discuss concavity and point of inflexion of the curve in R2 4. To find asymptotes of curves including Cauchy's method. 5. Method of Integration: Partial fraction, Limit of sum using definite integral, substitution 6. Method, Integration by parts. 7. Reduction formulae only for definite integrals. 8. Application of Integration-I (Arc length and Area) 9. Application of Integration-II (Volume and surface Area) 10. Application of Leibniz theorem. 11. Discuss convergence of the infinite series. 12. Problem on Mean value theorem 13. Expansion of function in infinite power series using Taylor's and Maclaurin's formula 14. Evaluate limits using L'Hospital's Rule 15. The differential equations of order 1 and degree 1. 16. The differential equations of order 1 and higher degree. 17. The differential equations of higher order and degree
Text Book:	
Reference Books:	

SEMESTER-II	
	Applied statistics
Units	**Unit Details**
I	Sampling Methods: Concept of population and sample, Characteristics of good sample. Simple random Sampling (with replacement and without replacement), Systematic sampling, Stratified random sampling (simple examples), Cluster sampling (concept only), Advantages and disadvantages
II	Time series: Introduction, various components of time series: Trend, Seasonal, Cyclic and Random components. Methods of measuring Trend by (a) Graphical method (b) Moving average method, (c) Least squares method, Concept of principle of least squares, linear and quadratic functions by the principle of least squares and to estimate trend for simple numerical data. Seasonal indices and simple examples to obtain seasonal indices.
III	: Index Numbers: Introduction, Use of Index Numbers, Types of Index numbers, Construction of Index Numbers of prices and quantities, Tests of consistency of Index numbers.
IV	Economic Statistics: Demand and supply function, Demand law, Supply law, Market Equilibrium, Revenue , Concept of price elasticity of demand and supply, Interpretations of their values, Idea of Monopoly, Maximization of profit under monopoly, Concept of total utility and marginal utility, Maximization of utility, Examples.
Text Book:	
Reference Books:	

SEMESTER-II	
	Statistics Using R
Units	**Unit Details**
I	Fundamentals of R
II	Data exploration and Data visualization, Univariate and Bivariate Data
III	Descriptive statistics, Correlation and regression using R
IV	• Sampling methods and Time series using R
Text Book:	
Reference Books:	

SEMESTER – II	
Electives	
Environmental Studies	
Units	**Unit Details**
I	Definition, scope and importance, need for public awareness.
II	**Renewable and non-renewable resources :** Natural resources and associated problems. a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people. b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. d) Food resources: World food problems, changes caused by agriculture and over-grazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. Case studies. f) Land resources : Land as a resource, land degradation, man induced landslides, soil erosion and desertification. • Role of an individual in conservation of natural resources. • Equitable use of resources for sustainable lifestyles. (8 lectures)
III	**Ecosystems** • Concept of an ecosystem. • Structure and function of an ecosystem. • Producers, consumers and decomposers. • Energy flow in the ecosystem. • Ecological succession. • Food chains, food webs and ecological pyramids. • Introduction, types, characteristic features, structure and function of thefollowing ecosystems :- a. Forest ecosystem b. Grassland ecosystem c. Desert ecosystem d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)(6 lectures)
IV	**Biodiversity and its conservation** (8 lectures) • Introduction – Definition: genetic, species and ecosystem diversity. • Biogeographical classification of India • Value of biodiversity : consumptive use, productive use, social, ethical, aestheticand option values • Biodiversity at global, National and local levels. • Inida as a mega-diversity nation • Hot-sports of biodiversity. • Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. • Endangered and endemic species of India • Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.
V	**Environmental Pollution** (8 lectures) Definition

	• Cause, effects and control measures of :- a. Air pollution b. Water pollution c. Soil pollution d. Marine pollution e. Noise pollution f. Thermal pollution g. Nuclear hazards • Solid waste Management : Causes, effects and control measures of urban and industrial wastes. • Role of an individual in prevention of pollution. • Pollution case studies. • Diaster management: floods, earthquake, cyclone and landslides.
VI	**Social Issues and the Environment** (7 lectures) • From Unsustainable to Sustainable development • Urban problems related to energy • Water conservation, rain water harvesting, watershed management • Resettlement and rahabilitation of people; its problems and concerns. Case Studies • Environmental ethics: Issues and possible solutions. • Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies. • Wasteland reclamation. • Consumerism and waste products. • Environment Protection Act. • Air (Prevention and Control of Pollution) Act. • Water (Prevention and control of Pollution) Act • Wildlife Protection Act • Forest Conservation Act • Issues involved in enforcement of environmental legislation. • Public awareness.
VII	**Human Population and the Environment** (6 lectures) • Population growth, variation among nations. • Population explosion – Family Welfare Programme. VII • Environment and human health. • Human Rights. • Value Education. • HIV/AIDS. • Women and Child Welfare. • Role of Information Technology in Environment and human health. • Case Studies.
VIII	**Field work** • Visit to a local area to document environmental assetsriver/forest/grassland/hill/mountain • Visit to a local polluted site-Urban/Rural/Industrial/Agricultural • Study of common plants, insects, birds. • Study of simple ecosystems-pond, river, hill slopes, etc. (Field work Equal to 5 lecture hours)
Book: Prof. Erach Bharucha Director Bharati Vidyapeeth Institute of Environment Education & Research, Pune	

SEMESTER-II	
Electives	
Writing and Presentation Skills	
Units	**Unit Details**
I	**Theory of Communication** Definition & process of Communication - Verbal – Non-verbal Communication – General and Technical Communication -Dimensions of Communication – Language as a tool – Levels of Communication - Flow of Communication - Features of effective Communication - Barriers to effective Communication - Objectives of Communication
II	**Written Communication** Understanding the basics of traditional letter writing - Business Letters: Inquiry & Reply letters, Placing, Execution and Cancellation of an orders – Covering Letter – Email Communication – Job Application - Resume
III	**Speaking Strategies/Presentation Skills** Listening skills: Importance - Cultivating Listening Skills - Interview: Introduction, General preparation for an Interview, Types of questions generally asked – Presentation: Preparing an outline of the presentation, Using visual aids - Body language and effective presentation.
IV	**Reading Skills** • Importance of Reading • Pleasure of Reading • Types of Reading • Calculating Reading speed and Accuracy • Techniques to read faster and better • Technique of SQ3R, Practising Comprehension • How to identify the core ideas of reading material

Text Book:

1. Communication Skills Publisher - Meenakshi Raman, Sangeeta Sharma- Oxford University press.

2. The ACE of Soft skills
   Publication: Pearson
   By Gopalaswamy Ramesh, Mahadevan Ramesh
   Corporate Skills
   Publication: Rupa & Co 2010, New Delhi .By
   Gulati, Sarvesh

Reference Books:

1. Communication Skills Publisher – Leena Sen - Prentice Hall of India Pvt. Ltd.
2. Effective Technical Communication - M Asharaf Rizvi - Tata Mac. Co. Ltd.
3. Business English & Communication - Lyn R. Clark, Kenneth Zimmer and JoshophTinervia - Mac Graw Hill International edition

BSC COMPUTER SCIENCE

SYLLABUS

SEMESTER-III

SEMESTER – III		
	Data Structures using C++	**Credits - 5**

Course Objective:

This course introduces students to get the detail knowledge of basic data structures, representations, building and use of those data structures in different applications in real world.

Course Outcome:

At the end of the course, a student will be able to:

COBSC.01: Acquire the basic understanding and working of Data Structures and C++

COBSC.02: Discuss the concept of the Array, Linked list and various algorithms for data structure.

COBSC.03: Clarify the concept of the Searching, Sorting and various algorithms for data structure

COBSC.04: Acquire the basic understanding and working idea of the stack, operations of the Stack with Algorithm and Explanation

COBSC.05: Acquire the basic understanding and working idea of the queue, types of queue, operations with Algorithm and Explanation

COBSC.06: Clarify the concept of the tree, terminology, binary tree definition, representation of binary tree, operations on binary tree, types of binary tree with Algorithm and Explanation

COBSC.07: Distinguish the concept of the graph, basic terminology, representation of graphs, adjacency Matrix (Array), adjacency linked, traversal of the graph, application of graph, spanning tree with Algorithm and Explanation

Unit	Unit Details	Hours
I	**Object Oriented Concepts** ▪ Introduction to Object Oriented Programming ▪ Procedure Oriented and Object Oriented ▪ Difference Between C and C++ ▪ C++ Output/ Input ▪ Keywords in C++ ▪ New style of header file specification ▪ Comments in C++ ▪ Variables in C++ ▪ Reference Variables in C++ ▪ Function Overloading ▪ Structure in C++ ▪ Access Specifier ▪ Classes ▪ Objects in C++ ▪ Characteristics of Access Specifier ▪ Friend Functions ▪ Dynamic Memory Allocation Using “new” ▪ Dynamic Memory Deallocation ▪ Constructor ▪ Characteristics of Constructor ▪ Types of Constructor	18

	▪ Inheritance	
II	**Introduction to Data Structures, Arrays & Linked List Introduction:** Data, Data Types, Abstract Data Types (Primitive), User- Defined Data Types (Non-Primitive) , Data Structures: Definition, Classification of Data Structures and details of each classifications, **Array :** Definition, Mapping, Sparce Matrix, **Linked list:** Comparison of Array and Linked List, Types of Linked Lists, Representation of Linked Lists Operations on Doubly Linked Lists (Algorithm and Explanation), Creation, Traversal, Insertion: i. At Front, ii. In Between (After and Before), iii. At End, Deletion: i. From Beginning, ii. From Between, iii. From End **Searching**: Introduction to Searching, Searching Techniques: i. Sequential Search, ii. Binary Search **Sorting**: Introduction to Sorting, Sorting Techniques: i. Bubble sort, ii. Selection sort, iii. Insertion sort, iv. Quick sort, v. Merge sort	19
III	**Stack & Queues** **Stack:** Introduction (Idea of the Stack), Operations of the Stack (Algorithm and Explanation), Implementation of the Stack (Using linked list), Applications of the Stack: Definition: Reverse and Polish Conversion: Infix to Postfix using manually and stack for parenthesis and Non-parenthesis (with Algorithm), Recursion(Definition) **Queue:** Introduction (Idea of the Queue), Types of Queue, Operations of Simple and Circular Queue (Algorithm and Explanation), Implementation of the Queue (Using Linked list)	19
IV	**Tree** Introduction, Terminology, Binary Tree: Definition, Representation of Binary Tree, Operation on Binary Tree, Creation, Insertion, Deletion Traversal (Pre-Order, In-Order and Post-Order), Conversion from (Pre, In or Post) into Binary Tree, Types of Binary Tree, Full Binary Tree Complete Binary Tree, Binary Search Tree, Expression Tree, Threaded Binary Tree, Heap Tree, Height Balanced Tree (AVL Tree), B-Tree **Graph** Introduction, Basic Terminology, Representation of Graph, Adjacency Matrix (Array), Adjacency Linked, Traversal of Graph, Breadth First Traversal (Algorithm and Tracing), Depth First Traversal (Algorithm and Tracing), Application of Graph, Spanning Tree, Minimum Spanning Tree (BFS and DFS), Prim's Algorithm, Kruskal's Algorithm, Shortest Path Algorithm, Dijkstra's Algorithm	19

Text Book:

1. Object Oriented Programming with C++, Publication: Pearson, By Subhash KU
2. Data and File Structures using C Publisher: Oxford By Reema Thareja

• Chapter-4 (4.1, 4.2, 4.3) – Introduction to Data Structures
• Chapter-5 (5.1, 5.2, 5.3, 5.6.5, 5.16) – Array and Searching
• Chapter-8 (8.2, 8.7) – Linked List
• Chapter-9 (9.1, 9.3, 9.4, 9.5, 9.7, 9.8, 9.11, 9.12, 9.13, 9.14, 9.16*Only Definition+,9.17*Definition and 9.17.1+

) – Stack & Queues
• Chapter-10 (10.1, 10.2, 10.4*excluding 10.4.4+) - Tree
• Chapter-11 (11.1, 11.2.2, 11.2.3, 11.3, 11.4 *Definition and 11.4.2+, 11.6*Definition and 11.6.2+) - Tree
• Chapter-12 (12.1*Definition and 12.1.1, 12.1.2+) - Tree
• Chapter-13 (13.1, 13.4, 13.5, 13.7*excluding 13.7.5+) - Graph
• Chapter-14 (14.1, 14.2, 14.3, 14.4, 14.5, 14.6) – Sorting

Reference Books:

1. Data Structures and Algorithms in C++ Publisher: Dreamtech By B. M. Harvani
2. Magnifying Data Structures Publisher: PHI By: Arpita Gopal
3. Data Structures using C & C ++ Publisher: Wiley-India By : Rajesh K. Shukla
4. Introduction to Data Structures in C Publisher: Pearson Education By: Ashok N. Kamthane

Data Structures Using C Publisher: Pearson Education By : A. K Sharma

5. Object Oriented Programming using C++ Publication: Cengage Learning By Joyce Farrell

Data Structures using C++ Practicals	
Unit	**Program List**
I	1. Write a program to calculate the area of circle, rectangle and square using function overloading. 2. Write a program to demonstrate the use of default arguments in function overloading. 3. Write a program to demonstrate the use of returning a reference variable. 4. Create a class student which stores the detail about roll no, name, marks of 5 subjects, i.e. science, Mathematics, English, C, C++. The class must have the following: a. Get function to accept value of the data members. b. Display function to display values of data members. c. Total function to add marks of all 5 subjects and store it in the data members named total. 5. Using a friend function, find the average of three numbers from three different classes. Write all necessary member functions and constructor for the classes. 6. Write a base class named Employee and derive classes Male employee and Female Employee from it. Every employee has an id, name and a scale of salary. Make a function ComputePay (in hours) to compute the weekly payment of every employee. A male employee is paid on the number of days and hours he works. The female employee gets paid the wages for 40 hours a week, no matter what the actual hours are. Test this program to calculate the pay of employee.
II	**Link List** 1. Write program to implement following operations using Singly link list • Insert at first • Insert at Last • Insert at specified location (Before or After the Node) • Delete from first

	• Delete from last • Delete any specified node • Traversal • Sorting • Splitting • Merging • Counting Operations(Total no. of nodes, even and odd no. of nodes) 2. Write program to implement following operations using Doubly link list • Insert at first • Insert at Last • Insert at specified location (Before or After the Node) • Delete from first • Delete from last • Delete any specified node • Traversal • Sorting • Splitting • Merging Counting Operations(Total no. of nodes, even and odd no. of nodes)
III	**Searching and Sorting** 1. Write a program to implement sequential search. 2. Write a program to implement binary search. 3. Write a program to implement bubble sort. 4. Write a program to implement selection sort 5. Write a program to implement merge sort 6. Write a program to implement quick sort Write a program to implement insertion sort.
IV	**Stack** 1. Write a program to implement following operations in stack Using Linked List. • PUSH • POP • PEEP • CHANGE 2. Write a program to implement recursion. 3. Write a program to reverse the string using the stack. **Queue, Tree and Graph.** 1. Write a program to implement Simple Queue operations using Linked List. • ENQUEUE • DEQUEUE • Traversal (display) 2. Write a program to implement Circular Queue operations Using Linked List. • ENQUEUE • DQUEUE • Traversal (display)

	3. Write a program to implement following operations on Binary Search Tree using Linked List. • Creation • Insertion • Traversal(In-order, Pre-order, Post-order) 4. Write a program to implement following DFS and BFS traversal Of a graph.

SEMESTER – III		
	Operating System	**Credits - 4**

Course Objective:

Students would be able to

1) Know the components of an operating system
2) Understand the basics of process management and memory management.
3) Know the concepts of I/O and file systems
4) Provide information about the functions and roles of each of the components of the operating system.

Course Outcome:

At the end of the course, the student will be able to:

COBSC.01: Clarify the basic understanding of the Operating system.

COBSC.02: Describe the concepts of process and can practice various process Scheduling Algorithms.

COBSC.03: State and interpret the role of Process Synchronization in increasing throughput of the system and can practice various deadlock concepts for handling deadlock

COBSC.04: Describe the techniques of memory management.

COBSC.05: Describe the concept of the device management and can practice algorithms for device handling seek strategies.

COBSC.06: Clarify the file system concept and can recognize security issues with the system.

Unit	Unit Details	Hours
I	**Introduction to Operating System & Processor Management** • **Introduction to Operating System** ▪ What is Operating System? ▪ Operating system software ▪ Types of Operating System • **Processor Management** ▪ Job Scheduler, Process Scheduler, ▪ Job and Process Status ▪ Process Control Block ▪ Process Scheduling Policies ▪ Process Scheduling Algorithms: First Come First Serve, Shortest Job Next, Priority Scheduling, Shortest Remaining Time, Round Robin • **Process Synchronization** ▪ What is parallel Processing? ▪ Typical Multiprocessing configurations ▪ Process Synchronization Software-test and set, Wait and Signal ▪ Semaphores ▪ Process Cooperation-Producers and consumers	15

II	**Deadlock & Device Management** • **Deadlock** ▪ Seven cases for dead lock ▪ Conditions for Deadlock ▪ Strategies for handling Deadlocks ▪ Starvation(Dining Philosophers Problem) **Device Management** ▪ Types of System Devices ▪ Component of I/O subsystem ▪ Communication among devices ▪ Management of I/O requests • Device Handler Seek Strategies ▪ FCFS ▪ SSTF ▪ Elevator(Look) ▪ RAID	15
III	**Memory Management** • **Memory Management: Early System** ▪ Single User Contiguous Scheme ▪ Fixed Partitions ▪ Dynamic Partitions ▪ Allocation and deallocation methods ▪ Relocatable Dynamic Partitions • **Memory Management: Virtual Memory** ▪ Paged Memory Allocation ▪ Demand Paging ▪ Page Replacement Algorithms o First In First Out o Least Recently Used ▪ Segmented Memory allocation ▪ Segmented/Demand Paged Memory allocation ▪ Virtual Memory	15
IV	**File Management & Security** ● **The File Manager** ● **Interacting with the file manager** ▪ Typical Volume Configuration ▪ About Subdirectories • **File Organization** • **Physical storage allocation** • **Data Compression** • **Access Control Verification module** • **Security** ▪ Role of Operating system in security ▪ Security Breaches	15

	▪ System Protection	

Text Book:

1) Operating Systems Publication: Cengage learning By Flynn/Mc Hoes,

Reference Books:

1) Operating Systems Concepts
   Publication: Pearson Higher Education
   By Silberschatz, Galvin &Gagne
2) Operating Systems: Internals and Design Principles,
   5/E Publication: Pearson Higher Education
   By William Stallings

SEMESTER – III		
	Database Management System with Oracle	**Credits - 5**

Course Objective:

Students would be able to decide where and how to store and retrieve the information effectively using the advanced concept of database. Understanding to design database tables and establish relationships between them using SQL.

Course Outcome:

At the end of the course, a student will be able to:

COBSC.01: Acquire the basic concept and understanding of structured query language (SQL), Data Definition and manipulation Commands, Aggregate functions and view.

COBSC.02: Analyze and manage the need of business intelligence, data warehouse, Online Analytical Processing and Data Mining.

COBSC.03: Acquire the detailed understanding of the Distributed Database Management System with Levels of Data and Process Distribution and Introduction to Distributed Database Transparency Features in detail.

COBSC.04: Distinguish different methods of Advance SQL like Set Operators, types of SQL Join, different types of SQL Functions

COBSC.05: Distinguish different methods of Advance SQL like Subqueries, different types of Subquery Operators and Sequence.

Unit	Unit Details	Hours
I	**Introduction to SQL** **Data Definition Commands:** Data Types ,Creating Table Structures, SQL Constraints **Data Manipulation Commands:** Adding Table Rows ,Saving Table Changes, Listing Table Rows, Updating Table Rows ,Restoring Table Contents, Deleting Table Row **Select Query:** With Conditional Restrictions, Arithmetic Operators, Logical Operators, Special Operators **Advanced Data Definition Commands:** Changing a Column's Data Type, Changing a Column's Data Characteristic, Adding a column, Dropping a column, Advanced Data Update, Copying Parts of Table, Adding Primary and Foreign Key Designations, Deleting Table From The Database **Aggregate Functions View** **Practical:** **Create table structures:** With Different data types of SQL with use of necessary constraints like Primary Key, Foreign Key, Not Null, Unique, Default, Check **Perform following data manipulation commands on table** **For Example:** Adding Table Rows, Saving Table Changes, Listing Table Rows, Updating Table Rows, Restoring Table Contents, Deleting Table Row	18

II	**Business Intelligence and Data Warehouse:** The need for data analysis **Business Intelligence** : Business Intelligence Architecture, Decision Support Data: Operational Data Vs. Decision Support Data, Decision Support Database Requirements **The Data Warehouse** **Online Analytical Processing:** Multidimensional Data Analysis Techniques, Advanced Database Support o Easy-To-Use End-User Interface, Client/Server Architecture **Data Mining** **Practical:** **Perform select queries on different tables:** with arithmetic operators with conditional restrictions, with logical operators, with special operators **Apply advanced data definition commands on table For Example:** Changing a Column's Data Type, Changing a Column's Data Characteristic, Adding a column, Dropping a column, Advanced Data Update, Copying Parts of Table, Adding Primary and Foreign Key, Designations, Deleting Table From The Database	19
III	**Distributed Database Management System** **Distributed Database Management Systems:** Evolution of DDBMS, Distributed Processing and Distributed Database, DDBMS Advantages and Disadvantages, Characteristics of DDBMS, Components of DDBMS **Levels of Data and Process Distribution:** Single-Site Processing, Single-Site Data(SPSD), Multiple-Site Processing, Single-Site Data(MPSD), Multiple-Site Processing, Multiple-Site Data(MPSD) **Distributed Database Transparency Features** **Distributed Transparency** **Transaction Transparency:** Distributed Requests and Distributed Transactions, Distributed Concurrency Control, Two-Phase Commit Protocol **Performance Transparency and Query Optimization** **Practical:** **Perform select query with aggregate functions:** Min, Max, Count, Sum, Avg **Apply set operators on any given two tables:** Union,, Union All, , Intersect, Minus **Perform join on given two or more than two tables:** Cross Join, Natural Join, Join Using Clause, Join On Clause, Outer Join	19
IV	**Advance SQL** **Set Operators:** Union, Union All, Intersect, Minus **SQL Join** : Cross Join, Natural Join, Join Using Clause, Join On Clause Outer Join **SQL Functions** : Date and Time, Numeric, String, Conversion **Subqueries** : Where Subqueries, In Sub queries, Multirow Subquery Operators: Any and	19

	All, From Subqueries, Attribute list Subqueries Correlated Subqueries **Sequence** **Practical:** **Demonstrate the use of SQL functions using SQL query on different tables:** Date and Time, Numeric, String, Conversion **Demonstrate the use of sub queries on different tables:** Where, In, Having, Multi rows (Any/ All), From sub query, Attribute list, correlated **Create sequences and demonstrate the use of sequence.(Create, Use and Delete)**	

Text Book:

1) Database System Concepts (First Edition: 2008)
   Publisher: Cengage Learning By Peter
   Rob and Carlos Coronel
   Chapter-12 (12.1, 12.2, 12.3, 12.4, 12.5, 12.6, 12.7, 12.8, 12.9, and 12.10)),
   Chapter-13 (13.1, 13.2, 13.3, 13.4,(13.4.1, 13.4.2), 13.5, 13.6(13.6.1, 13.6.2, 13.6.3, 13.6.4), 13.9) Excluding (13.5.1, 13.5.2, 13.6.5, 13.6.6, 13.6.7, 13.6.8,13.7, 13.8, 13.10)
   Chapter-7 (7.1, 7.2 (7.2.4, 7.2.5, 7.2.6, 7.2.7) 7.3, 7.4, 7.5, 7.6.3) Excluding (7.1.1, 7.1.2, 7.2.3)
   Chapter-8 (8.1, 8.2, 8.3, 8.4, 8.5)

Reference Books:

1) Introduction to Database Management Systems (First Edition 2006)
   Publisher: Tata McGraw-Hill By ISRD Group
2) An Introduction to Database Systems (Eighth Edition 2006)
   Publisher: Pearson By C. J. Date, A. Kannan & S. Swamynathan

3) An Introduction to Database Systems Publisher: Pearson By ITL Education Solutions Limited.

Database Management System with Oracle Practicals

1. CUST(CID,CNAME,CCITY,DOB)

   PROD(PID,PNAME,PCOST,PPROFIT)

   SALE_DETAIL(CID,PID,SALE,SALE_DATE)

   1) Write a query that display purchase detail of all customers based on sale date.

   2) Display the Name of customers who are born in 1985.

   3) Display the name of product starts with “s”.

   4) Display details of product having maximum sales.

2. BRANCH_MASTER(B_NO,B_NAME,LOCATION)
   CUSTOMER_MASTER(C_NO,C_NAME,GENDER,DOB,CITY,CONTACT_NO)
   ACCOUNT_MASTER(ACC_NO,ACC_TYPE,B_NO,C_NO,OPEN_DATE,CURR_BALANCE)
   1) Display details of male customers only.

   2) Display the details of account opened in 1999.

   3) List all records where current balance not less than 4000.

   4) List all branch names where branch number is 1 or 3.

3. EMP(EMP_NO,EMP_NAME,DESIGNATION,MGR_NO,HIREDATE,SALARY, COMMISSION,DEPT_NO)
   DEPT(DEPT_NO,DEPT_NAME,LOCATION)

   1) List DEPTNO as DEPARTMENT NUMBER, Count of Employees as “Number of Employees”
   FROM Employee table.

   2) List all employees who earn more than the average salary of their departments.

   3) List DEPTNO, sum of salary department wise of employees who earn more than 2000.

   4) Create a view on all the employee details of deptno=10.

4. PERSON (P_ID, LASTNAME, FIRSTNAME, ADDRESS, CITY) ORDER (O_ID, ORDERNO, P_ID,ORDER_PRICE)
   1) List all persons in Norway and USA:

   2) Select only the records with NULL values in the "Address" column

   3) List firstname ,lastname with an Order month “November”.

4) Count the no of persons having average order price=20;

5. PROGRAMMER(NAME,DOB,DOJ,PROF1,PROF2,SALARY) SOFTWARE(NAME,TITLE,DEV_IN,SCOST,DCOST,SOLD) STUDIES (NAME,SPLACE,COURSE,CCOST)
   1. How many programmers have done the PGDCA course.
   2. Display the institute names from the Studies table without Duplicates.
   3. Display details of software having maximum scost.
4. Display the names of the programmers whose names contain 2 Occurrences of the letter ‘A’:

SEMESTER-III		
	Python - I	**Credits - 2**

Course Objective:
Problem solving and programming in using Python with a special emphasis on Data Science, Big Data, Data Presentation and Data Wrangling.

Course Outcome:
At the end of the course, the student will be able to:
COBSC.01:To get an introduction of Python Programming
COBSC.02: To understand the syntax and semantics of writing algorithms and programs in Python.
COBSC.03: To learn how to make use of Function, Lists and strings.
COBSC.04: To get acquaintance with the processing of Files and usage.

UNIT	Unit Details	Hours
I	Python in Data Science – Introduction to Python and programing – Using Idle - Variables, Operation and Types – Algorithms for programing – Conditional Statements: If, else, elif – Alternative statements – Boolean expressions – For loops - While loops, continue, break.	10
II	Python Functions – Functions of functions – function calls – function definitions – Local and Global variables – Lists – Manipulating Lists – Objects and Methods – Strings – String Processing – Accessing strings – slicing strings.	5
III	Files – Interacting with files – Processing Files – Formatting Strings – Pretty printing – More on string and file processing – Python and encoding – Python Modules Use of OS – module – Random Module – Functions with default arguments – Anonymous functions.	10
IV	Python Dictionaries – Uses of dictionaries – Multi Dictionaries – working with dictionaries – Recursion and Memorization – Tuples – using tuples – sets – Frozen sets.	5

Text Book:
1. Python Programing for the absolute beginner 3rd edition – Michael Dawson – Cengage Learning.
2. Python 3 for Absolute Beginners – Tim Hall and J P Stacey – Apress.

Reference Books:
1. Introducing Python - by Bill Lubanovic - O'Reilly
2. Python Cookbook – Alex Martelli, Anna Martelli Ravenscroft and David Ascher - O'Reilly
3. Think Python – Allen B Downey - O'Reilly
4. Python Data Science Cookbook – Gopi Subramanian – PACKT Publishing.
5. Python for Data Analysis – Wes McKinney - O'Reilly
6. Python Machine Learning – Sebastian Rachka - PACKT Publishing

SEMESTER-IV

SEMESTER – IV		
	JAVA Programming	**Credits - 5**

Course Objective:

Students would be able to:

1.) Create their own logic and implement using java language for problem solving.
2.) Understand how to use JAVA programming for real life applications.

Course Outcome:

At the end of the course, the student will be able to:

COBSC.01: Clarify the concept of Object Oriented Programming and describe the basic concepts of Java Programming Language, creation of the class and its objects.

COBSC.02: Describe the concepts of looping, String, Arrays and Wrapper classes.

COBSC.03: Clarify the concepts of Exception handling techniques, Inheritance and Interface.

COBSC.04: Describe the concepts of Package, Multithreading and Applet

Unit	Unit Details	Hours
I	**Java Introduction** • Creating first java classes • Introduction to Object Oriented Programming Concept • Learning about Java • Features of Java • Analyzing a java application that uses console output • Adding comments to a java • Saving, compiling and running a java application • Creating a java application using GUI output • Using data within java programs o Constants • Literals • variables • Keywords • Identifiers • Data Types ▪ Integer ▪ Floating point ▪ Character ▪ Boolean • Understanding numeric type conversion • Operators in Java ▪ Arithmetic ▪ Relational (Comparison operators) ▪ Boolean Logical ▪ Increment and Decrement ▪ Conditional ▪ Bitwise • Using the JOptionPane Class for GUI input • Using methods, classes and objects • Creating methods with zero, one and multiple arguments • Class concepts and creating a class • Creating instance methods in a class • Declaring objects and using their methods • Static method • Understanding block and scope	18

	• Method overloading • Constructors • Sending arguments to constructors • Constructors overloading • 'this' keyword • Static variable • Working with constants	
II	**Decision Making, Looping, Strings, Arrays and Wrapper Classes** • Flow Control Statements o if and if…..else o Nesting if… else o Using logical AND and OR operators o switch statement o Using the conditional AND not operators o Using the NOT operator o Understanding precedence • Looping o while loop o Using the arithmetic operators o for loop o do…. while loop o Nested loops • Characters, String class and String Buffered class o Manipulating characters class ▪ isUpprCase(), toUpperCase(), isLowerCase(), ▪ toLowerCase() ▪ isDigit(), isLetter(), isLetterOrDigit(), isWhitespace() o Manipulating String class o Declaring a String Object o Comparing String values ▪ toUpperCase() , toLowerCase() ▪ length(), indexOf(), charAt(), ▪ endswith(), startWith() ▪ replace(), toString() o Manipulating StringBuffer class ▪ setLength(), capacity(), append(), insert() ▪ setChartAt(), charAt() • Arrays o Declaring and initializing an array o Using subscripts with an array o Passing array to methods o Creating arrays of strings o Using two-dimensional and multidimensional arrays o The Arrays class binarySearch(), equals(), fill(), sort() methods of array class • Wrapper Classes (Overview) o Byte class, short class, Integer class, Long class, Float class, Double class, Boolean class	**19**
III	**Exception Handling and Inheritance** • Excepting Handing o Learning about exceptions o o Understanding the limitations of traditional error handling o Trying code and catching exceptions	**19**

	o Throwing and catching multiple exceptions o 'finally' block o Understanding the advantages of exception handling o Checked and unchecked exception o Creating own exceptions (custom exception) • Inheritance o Concept of inheritance o Extending classes o Method overriding o Constructor calling during inheritance o Super class constructor that require arguments (using 'super' keyword) o Accessing super class methods (using 'super' keyword) o Method which cannot be override ▪ 'final' method ' ▪ final' super class ▪ Static method o Interfaces and Abstract Classes o Defining Abstract class o Using Abstract class o Defining Interfaces o Implementing Interfaces o Multiple inheritance using Interfaces	
IV	**Packages, Multithreading, Applets and Applets Graphics** • Packages o Define a Package o Creating a Package o Class and package o Import statement o Importing a Package Access Protection (Access modifiers) • Multithreading o Introduction o Thread Life Cycle o Creating and running thread (using Thread class and Runnable interface) o Thread Priorities o Thread join(), sleep() method • Applets o Introduction o Lifecycle of an Applet o Comparing Applets and Application o Creating Applets o Parameters passing in applet • Applets Graphics o Line, Rectangles, Ovals, Arcs, Polygons, Polyline methods	**19**

Text Book:

JAVA for Beginners Publication : Cengage Learning By: Joyce Farrell

Reference Books:

1. Object Oriented Programming in java Publication : Dreamtech By Dr. G.T.Thampi

JAVA Programming Publication: Pearson By Hari Mohan Pandey

Java Programming Practicals	
Unit	**Program List**
I	1. Write a program to calculate the hypotenuse of right angled triangle when other sides of the triangle are given. (Hypotenuse = square root (x*x + Y *Y)) 2. Write a program to evaluate simple interest of a given principle, rate and time. 3. Write a program to find maximum of two numbers without using third variable. 4. Write a program using the arithmetic operators to perform algebraic operations on two numbers. (Algebraic operation is +, - , *, /, %) 5. Write a program to calculate the area of square and rectangle by overloading the area method. 6. Write a java program to display powers of 2 i.e. 2,4,8,16 etc up to 1024 using bitwise operators. 7. Write a java program to scan 3 integer values from the user and display the minimum using conditional operator. 8. Write a program to convert inches to centimeters. 9. Create a complex number class. The class should have a constructor and methods to add, subtract and multiply two complex numbers and to return the real and imaginary parts.
II	1. Write a program to print even number up to 10 using while loop. 2. Write a program to check whether the given number is even or odd. 3. Write a program to demonstrate calculator using switch statement 4. Write a program to create an array to store 5 integer values. Also initialize the array with 5 numbers and display the array Elements in reverse order. 5. Write a program to create integer array containing 10 values. Then print all the prime numbers contained by the array. 6. Write a program to create a character array to store 6 characters. Also initialize the array with 6 random characters. Now create another array containing 10 characters. Copy the elements ranging from index 2 to 4of first array to second array at the same index. 7. Write a program to sort a list of students on the basis of the marks. 8. Write a java program that accepts a string from users and display each character on separate line in reverse order. 9. Write a program to create a string array and sort all the string contained by the array. 10. Write a program to create a string using the string class and check whether the string is a palindrome or not. A string is a palindrome that is spelled the same both forwards and backwards.

III	1. Write a program to display the sum of digits of given numbers with exception handling. 2. Write a java program which takes 2 arguments - a string and its length. If the length of the string is not according to given one then throw the user defined LengthMatchException and handles it appropriately. 3. Write a Java program to input n integer numbers and display lowest and second lowest number. Also handle the different exceptions possible to be thrown during execution. 4. Write a java program that accepts 5 even numbers from command line. If any of the number is odd then throw custom exception OddException and count such invalid numbers. 5. Write a program to define custom exception called "no match exception" that is thrown when a string is not equal to "internet" This string is providing through command line argument. 6. Consider an employee class, which contains fields such as name and designation. And a subclass, which contains a field salary. Write a program for inheriting this relation. 7. Write a class with a method to find the area of a rectangle. 8. Create a subclass to find the volume of a rectangular shaped box. 9. Write a program to calculate arithmetic mean in the superclass and standard deviation in the subclass.
IV	1. Write a program to calculate the area by using an interface. 2. Write a program to show use of the import statement. 3. Write an interface called Numbers, with a method int Process(int x, int y). Write a class called Sum, in which the method Process finds the sum of two numbers and returns an int value. Write another class called Average, in which the Process method finds the average of the two numbers and returns an int. 4. Write a java program to create 3 threads using Thread class. Three threads should calculate the sum of 1 to 5, 6 to 10 and 11 to 15 respectively. After all thread finishes main thread should print the sum and average. 5. Write a java program that accepts marks of 5 subjects from display the average. If any value is not between 0 and 100 then throw custom exception RangeException and handle it. 6. Write a java program 1" at every 1000 Milliseconds and other should display "Thread 2" at every 3000 milliseconds to create 3 threads using Runnable interface. Three threads should calculate the sum of 1 to 5, 6 to 10 and 11 to 15 respectively. After all thread finishes main thread should print the sum and average. 7. Write a Java applet that draws a circle centered in the center of the applet and filled with random color. Radius of the circle should be passed as a parameter. 8. Write an applet that take three numbers as parameters and displays their sum and average. 9. Write a java program that creates two threads using Runnable interface. One thread should display "Thread ". 10. Write a Java applet that draws a circle divided in 6 equal parts

SEMESTER – IV		
	Multimedia and Computer Graphics	**Credits - 5**

Course Objective:

This course helps students to understand the 2D animation, Storyboarding and create animated digital multimedia content for media along with the importance of computer graphics and its various techniques. Also

Course Outcome:

On the completion of the course students are able to:

COBSC.01: Implement the different elements of multimedia.

COBSC.02: Draw the attractive objects and designs using different tools.

COBSC.03: Understand and familiarize with 2D Animation environment.

COBSC.04: Make the animated advertisement, presentations, movie clips, and visual elements on the basis of their imagination.

COBSC.05: Understand the importance of computer graphics and its various techniques.

Unit	Unit Details	Hours
I	Introduction of Environment - Diving through User Interface - Import Artwork - Artwork Construction using different tools - Data Linking	18
II	Adding layers - Creating shapes - Basic animation - Animating shapes – Masking - Object bounce animation	19
III	Bone morphing animation - Cut-out animation - Audio synchronization - Looping background - Rescale animation - Final rendering process	19
IV	Introduction - Painting and Drawing - Elements of 3D Graphics - Hardware and Software - Pixels, Coordinates, and Colors – Shapes – Transforms - Hierarchical Modelling - Java Graphics2D	19

E- Book:

https://wiki.synfig.org/Category:Manual (Unit 1,2,3)

Text Book:

Introduction to Computer Graphics - David Eck (Unit 4)

Reference Books:

Synfig Studio (English version): 2D Animation, AMC college, Advanced Micro Systems Sdn Bhd

Multimedia and Computer Graphics Practical List
• Bouncing ball animation • E-card animation • Create star animation • Train animation • Plant animation • Logo animation • Basic bone animation • Cut-out animation • Rocket animation • Under water animation • Java Graphics2D Examples

SEMESTER – IV		
	System Analysis and Design	**Credits - 4**

Course Objective:

The objective of the course is to make student aware about fundamentals of software development life cycle and needs of different diagrams during development process at different levels. It covers various feasibility studies and all UML diagrams so students can analyze the requirements of the user and can develop the system. This course helps students to know about the significance and importance of every stage of software development in industry.

Course Outcome:

At the end of the course, a student will be able to:

COBSC.01: Understand how a software development process takes place in the IT industry and which models they use.
COBSC.02: What are the different stages of software development process like 'user requirement, collecting data, analysis of data, system design, system testing' and 'implementation' and also learn their importance.
COBSC.03: Learn different methods to collect data for the system.
COBSC.04: Draw data flow diagram where they can shows how data flows in the system from one module to another.
COBSC.05:Desing data dictionary
COBSC.06: Identify main entities of a software and how entities interact with the processes and how processes interact with the database.
COBSC.07: Analyze system requirement specifications and after that prepare a design of the system.
COBSC.08: Study various feasibility study and decide that the project is feasible or not.
COBSC.09: Understand the concept of Object oriented modeling and approach along with the Pillars of OOAD
COBSC.10: Use of various UML and draw a specific UML for one particular stage of software development process.

Unit	Unit Details	Hours
I	**System Analysis and Design –** Introduction - Software Development Models - Waterfall Model - The Incremental Model - The Spiral Model **System Analysis & Design (SAD) -** Introduction - Overview Feasibility Study - Operational Feasibility - Technical Feasibility - Economic Feasibility - Schedule Feasibility **Requirement Modeling / Fact-finding techniques -** Interview - Document review - Observation - Questionnaires and surveys - Data and Process Modeling - Data Flow Diagram: Concepts – Symbols - Rules - Construction of DFD for any Case Study **Data Dictionary –** Concepts – Rules - Construction of Data Dictionary for any Case Study.	**15**
II	**Object Oriented Analysis & Design –** Introduction **Object-Oriented Modeling** - Analysis Model - Architecture Model -	**15**

	Component Design Model **Object-Oriented Approach -** Object Orientation - Object-Oriented Analysis - Object-Oriented Design **The Constituents of OOAD -** Objects and Classes - Links and Association - Generalization and Specialization - Aggregation and Composition **Pillars of Object-Oriented Analysis and Design -** Abstraction - Encapsulation - Inheritance - Polymorphism - Coupling - Cohesion - Components - Interfaces **The Language of OOAD – Unified Modelling Language -** UML Diagrams	
III	**Use Case Diagram, Class Diagram and Object Diagram** **Use-Case Diagram -** Introduction - Scope of Use-Case Diagram - Benefits of Use-Case Diagram - Elements of Use-Case Diagram - Actors - Use-Cases - Relationship between Actor and Use Case - Relationship between Use-Cases - Relationship between Actors - Guidelines for design of Use-Case Diagram - Draw the Use-Case diagram for any Case study **Class Diagram -** Analysis and Design version of Class Diagram - Elements of Class Diagram - Guidelines for design of Class Diagram – **Object Diagram** - Introduction - Elements of Object Diagram: Objects Links - Guidelines for design of Object Diagram - Draw the Class and Object Diagram for any Case Study	**15**
IV	**Sequence Diagram, Collaboration Diagram, Activity Diagram & State Chart Diagram.** **Sequence Diagram -** Introduction - Elements of Sequence Diagram - Life Lines - Messages - Activation - Guards - Combined Fragments - Objects - Guidelines for design of Sequence Diagram - Draw the Sequence Diagram for any case study **Collaboration Diagram -** Introduction - Elements of Collaboration Diagram - Links - Messages - Objects - Guidelines for design of Sequence Diagram - Draw the Sequence Diagram for any case study **Activity Diagram -** Introduction - Elements of Activity Diagram - Initial State - Final State - Action / Activity - Transitions - Decision - Synchronization, Fork and Join - Swimlanes - Object and Object Flow - Guidelines for design of Activity Diagram - Draw the Activity Diagram for any case study **State Chart Diagram -** Introduction - Elements of State Chart Diagram - Initial State - Final State - State - Transitions - Guidelines for design of State Chart Diagram - Draw the State Chart Diagram for any case study	**15**

Text Book:

1) Magnifying Object-Oriented Analysis and Design Publisher: PHI Author: Arpita Gopal and Netra Patil System Analysis and Design Methods Publisher: Cengage Learling By: Gary B. Shelly, Thomas J. Cashman, Harry J. Rosenblatt

Note: Only Unit-1 will be covered from Text Book-2.

Reference Books:

1) System Analysis and Design with UML version 2.0 an Object-Oriented Approach Publisher: Wiley By: Alan Dennis, Barbara Haley Wixom, David Tegarden

Object-Oriented Analysis & Design with Unified Process Publisher: Cengage Learning By: Satzinger, Jackson, Burd

SEMESTER – IV		
	Python II	**Credits - 2**

Course Objective:

Problem solving and programming in using Python with a special emphasis on Data Science, Big Data, Data Presentation and Data Wrangling.

Course Outcome :

At the end of the course, the student will be able to:
COBSC.01: To learn about Comprehension and map in Dictionaries
COBSC.02: To learn about filtering of Lists and Dictionaries.
COBSC.03: To understand the concept of Exception handling.
COBSC.04: To get acquaintance with Classes and Objects.
COBSC.05: To learn about Address class and its various methods.
COBSC.06: To learn the various approach of data science in python.
COBSC.07: To get familiar with iterators, generators and decision trees.
COBSC.08: To study about GUI in python and information of TKInter.
COBSC.09: To learn the creation of various widgets and buttons.
COBSC.10: To get familiar with few animation games

Unit	Unit Details	Hours
I	Comprehension – map – filter – Comprehension in Action – listing of directories & sub directories – Filtering Lists – Copying Data Structures – Python Exceptions - Exception Handling – Multiple Exceptions – Finally clause – Raising exceptions.	6
II	Classes and Objects – OOP in Python – Class variables, Class objects, Object Variables and Object methods, Instantiation – Global Class – Class and Instance Methods – Dunder Method.	8
III	Class – Address class – str and repr methods – modular programing – Data Set Analysis – Python Iterators – Python Generators – While loops – Building decision Trees – Processing Iris Data set etc.	8
IV	Graphical user Interface – Graphics Programing – Information on TKInter – Creating an application – creating widgets – label widget – canvas widget – buttons – Grid Method - Input output bindings – TKInter variables – Radio buttons – variable classes – binding – guessing game – Animation.	8

Textbook :

1. Python Programing for the absolute beginner 3rd edition – Michael Dawson – Cengage Learning.
2. Python 3 for Absolute Beginners – Tim Hall and J P Stacey – Apress.

Reference Books:

1. Introducing Python - by Bill Lubanovic - O'Reilly
2. Python Cookbook – Alex Martelli, Anna Martelli Ravenscroft and David Ascher - O'Reilly
3. Think Python – Allen B Downey - O'Reilly
4. Python Data Science Cookbook – Gopi Subramanian – PACKT Publishing.
5. Python for Data Analysis – Wes McKinney - O'Reilly
6. Python Machine Learning – Sebastian Rachka - PACKT Publishing

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